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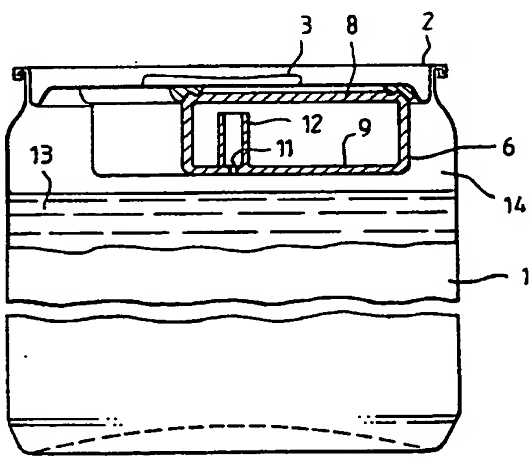

(57) Abstract

When dispensing carbonated beverages, particularly beers and especially draught stout, it is desirable to obtain a close-knit creamy head. This contributes to a creamy taste and adds considerably to the customer appeal. To provide such a head a container (1) containing a carbonated beverage (13), includes a pod (6) located within the head space (14) above the level of the beverage (13) and containg a gas, the pod (6) including a hole (11) in its lower part above the level of the beverage (13) and means (12, 16) to ensure that only gas is discharged from the pod (6). The arrangement is such that when the container (1) is closed the pressures of the gas in the pod (6) and in the head space (14) are in equilibrium, but, as soon as the container (1) is opened to reduce the pressure inside the head space (14) of the container (1) the gas at super atmospheric inside the pod (6) is jetted out of the hole (11) and into the beverage (13) in the container (1) to cause shear of the beverage (13) and the liberation of small bubbles which accumulate in a surface layer on the beverage (13). When the beverage (13) is dispensed the small bubbles in its surface layer act to seed the generation of small bubbles throughout the remainder.

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CARBONATED BEVERAGE CONTAINER

BACKGROUND OF THE INVENTION

When dispensing carbonated beverages, particularly beers and especially draught stout, it is desirable to obtain a close-knit creamy head. This contributes to a creamy taste and adds considerably to the customer appeal. Traditionally, such heads are only obtained when dispensing such beverages from draught. Another factor that considerably enhances the customer appeal is the way in which, when dispensing beverages, especially beers from draught, small bubbles are intimately mixed with the body of the beverage as it is dispensed and then, after dispensing is completed, the bubbles gradually separate out to form a close-knit creamy head.

The formation of such small bubbles liberated throughout the body of the beverage during dispensing can be encouraged by causing shear of the liquid with resulting local pressure changes which causes release of small bubbles of controlled and uniform size. Over the years many proposals have been made to increase and control the liberation of such small bubbles and the generation of heads on beverages. Our own earlier specification GB-A-1,378,692 describes the use of an ultrasonic transducer to subject the beer to shear immediately before it is dispensed into a drinking vessel and describes the way that by subjecting the initially dispensed portion of beverage to ultrasonic vibrations, the small bubbles released from this initial portion affect the remainder of the beverage by forming nucleation sites and triggering the generation of further small bubbles of controlled size.

PRIOR ART

GB-A-1,266,351 describes a system for producing a draught type head when dispensing beer, or other carbonated beverage, from a container such as a can or a bottle. In the arrangement described in this specification the container includes a simple secondary chamber which is

charged with gas under pressure either as part of the filling process in which the container is filled with beverage or by pre-charging the inner secondary chamber with gas under pressure. The secondary chamber includes a small orifice which is located beneath the surface level of the beverage in the container and the overall arrangement is such that, upon opening the container and so reducing the pressure in it, gas from the secondary chamber is jetted via the orifice into the beverage in the main body of the container so causing shear. This liberates the required small bubbles in the beverage which in turn act as nucleation sites during release of similar bubbles through-out the entire contents of the can or other container. The arrangements described in this patent specification are somewhat complex mainly requiring the use of a separate charging step to pressurize the secondary chamber after the container has been filled and mainly requiring the use of an especially designed divided container with a result that this technique has not been adopted commercially.

GB-B-2,183,592 describes a different technique which has recently achieved success in the market place. In this system a container containing a carbonated beverage includes, towards its base, a separate hollow insert with an orifice in its side wall. As part of the container filling process beer is deliberately introduced into the inside of the hollow insert through the orifice and the pressures of the inside of the insert and of the main body of the container are thereafter maintained in equilibrium via the orifice. Upon opening the container the beverage from inside the insert is jetted out through the orifice directly into the beverage in the body of the container and this jet acts to shear liquid in the container with the result that a number of small bubbles are liberated which, in turn, as they rise through the beverage in the container, act as nucleation sites to generate a number of small bubbles throughout the entire contents of the container. When dispensing a beverage from such a container

into a drinking vessel the liberation of small bubbles throughout the entire volume of the beverage as it is dispensed gives a similar appearance to dispensing the same beverage from draught.

This system has many disadvantages. It is essential to remove all of the oxygen from inside the hollow insert of substantial volume before filling the container with beer. The presence of oxygen inside the container leads to the beverage being oxidised with the resulting impairment of flavour and risk of microbial growth leading to, for example, acetification of the resulting beverage when it contains alcohol. Thus, there is a general requirement to displace substantially all of the oxygen from a container and its hollow insert before the container is sealed. The hollow insert has a substantial volume and with only a small orifice in its wall, this insert is filled with air it is difficult to displace all of the air during the filling and sealing of such a container.

The applicants have developed a comparable system which is described in International Publication Number WO91/07326 and again includes a hollow insert mounted towards the base of a carbonated beverage container. However, this hollow insert contains only non-oxidising gas and includes a valve, or similar means, to maintain the insert closed until the container is opened. Upon opening the container the valve, or other means, opens to allow gas to be jetted from the insert into the beverage. By providing an insert which is closed and contains no oxidising gas upon insertion into the container this avoids the problems with having to remove all of the oxygen from the inside of the hollow insert after it is placed inside the container and before the container is filled with beer, or other carbonated beverage. This arrangement has met with considerable commercial success and is capable of being filled at speeds of up to 1,600 cans per minute instead of the much slower speed of about 200 cans per minute which is the maximum speed available for the system described in GB-

B-2,183,592. However, the filled inserts have a restricted shelf life after pressurization and prior to filling of the container due to creep in the plastic which can result in the loss of pressurizing gas.

Both the arrangements described in GB-B-2,183,592 and that described in WO-A-07326 require the use of an over sized can, for example, typically the use of a 500 ml can with only 440 ml of beverage and both use a relatively large amount of plastic for the insert partly as a result of its large volume and partly to form flanges that provide an interference fit with the side wall of the can. This relatively large amount of plastic results in a high price addition to the overall pack price and this is also undesirable from a materials re-cycling point of view. Further, a small per centage of cans fail to operate as expected due to the fact that the insert becomes dislodged during handling and or mild abuse of the cans prior to their opening. Once the inserts are dislodged they tend to float to the top of the beverage in the container and then fail to operate as required. Further there is a need to specify a tight can diameter tolerance for cans to be used with this technique which is more demanding that the normal Metal Packaging Manufacturers Association (MPMA) standards.

SUMMARY OF THE INVENTION

In accordance with this invention, a container containing a carbonated beverage, includes a pod located within the head space above the level of the beverage and containing a gas, the pod including a hole in its lower part above the level of the beverage and means to ensure that only gas is discharged from the pod, the arrangement being such that when the container is closed the pressures of the gas in the pod and in the head space are in equilibrium, but, as soon as the container is opened to reduce the pressure inside the head space of the container, the gas at super atmospheric inside the pod is jetted out of the hole and into the beverage in the container to cause shear of the beverage and the liberation of small bubbles

which accumulate in a surface layer on the beverage, when the beverage is dispensed the small bubbles in its surface layer act to seed the generation of small bubbles throughout the remainder.

The means to ensure that only gas is discharged from the pod may include a valve which prevents beverage from entering the pod during filling and subsequent can handling procedures but preferably it comprises a tube surrounding the hole in the lower wall of the pod and extending upwards towards the top of the container closure. This arrangement ensures that, even if some liquid does enter the pod, upon opening of the container, only gas is jetted through the hole and into the beverage. It is desirable to prevent liquid entering the pod and being ejected since we have found that the action of jetting liquid into the surface of a beverage is less controllable than gas for the nucleation of micro-bubbles. It is believed that not only does the gas that is jetted into the beverage cause shear and mechanical shock to the beverage so resulting in the liberation of small bubbles but also, the jet of gas itself and any gas from the head space entrained with the jet of gas are converted into bubbles after it has penetrated into the beverage. It also appears that by jetting gas from outside the surface of the beverage into the beverage that the shear and micro-bubble seed formation required to give optimum heat formation can be controlled so that there is less risk of over foaming on opening the container than there is with the submerged insert systems disclosed above. This has a particular advantage when it is used with a beverage having a higher level of carbonation such as a lager having a carbonation level of 2.0 v/v and above.

Typically the hole in the lower part of the pod has a diameter between 0.1 and 2.0 mm and more preferably it has a diameter of substantially 0.9 mm.

The pod may be formed from two parts which are snap-fitted together, or welded together, in an atmosphere containing a inert gas or, alternatively, may be fitted

together after being dosed with a precursor of an inert gas such as dry ice or liquid nitrogen. In this way, after the pod is formed by closing its two parts together, the dry ice or liquid nitrogen evaporates to drive oxygen out of it to ensure that the pod is substantially filled with an inert gas. Alternatively, the pod may be formed in substantially the same way as described in our earlier application WO-A-00825 with the pod essentially being formed as an open-topped pod to enable it to be dosed with liquid nitrogen, or solid carbon dioxide, at the same time as dosing the open-topped container and then sealing the open-topped container with a closure which, in turn, either carries with it the second part of the pod or itself closes the open-top of the pod.

Preferably the pod is attached to, or, at least held in place by the top closure of the container. In the former case, the attachment of the pod to the top closure of the container may take place away from a beverage filling line and thus, no separate pod insertion stage is required as part of the beverage filling line. Thus the beverage filling line speed and efficiency are substantially unaffected. The container may have the form of a glass bottle and, in this case the pod substantially fills the head space in the neck of such a container. Preferably the pod is attached to the closure of such a bottle whether of a screw cap type or a crown cork type so that, upon opening the container the pod is removed from the neck of the bottle with the closure. Alternatively, the container may have the form of a metal can and in this case the pod is either fixed to the lid of the container by adhesive or is held in place by being trapped in the seam formed between the lid and the side wall of the container.

When the container has the form of a can preferably the can includes an easy-open feature such as a ring-pull or a stay-on tab. In this case it is important that the presence of the pod does not interfere with the operation of the easy-open feature and essential that the pod is

arranged not to interfere with dispensing beverage through the easy-open feature. Typically the pod does not cover the entire under surface of the lid of the can and is arranged to be absent from a portion of the lid immediately beneath the easy-open feature. Alternatively, the pod may be temporarily attached to the inside of the lid by an adhesive which breaks down on contact with a beverage or on the application of heat, for example, during a pasteurisation step. In this way, the pod is arranged to be firmly attached to the lid during the lid handling and container closing process but, subsequently, after the container is filled and sealed, this bond between the pod and the closure is arranged to be broken down. In this case it is preferred that the pod is also connected to the container by, for example, a protruding lip which is caught in the seam between the closure and the container so that, upon opening the container the pod can hinge about its protruding lip to allow the pod to be displaced from beneath the easy open feature and thereby allow a beverage to be dispensed from the inside of the can, whilst, at the same time, the pod is securely held by the lip being held in the seam.

With the arrangement in accordance with this invention the pod is accommodated entirely within the head space above the level of the beverage in the container and foam formation within the container can be controlled to a lower level than with submerged systems. This means that a standard size container can be used and the containers can be filled with generally conventional canning or bottling machinery operating at high speed. Since this system does not rely on the use of an interference fit between a submerged insert and the container it is not likely to become dislodged with abuse during handling and storage. Furthermore there is a substantial saving of material previously used to form the flanges of the submerged insert.

BRIEF DESCRIPTION OF THE DRAWINGS

Various examples of carbonated beverage containers in accordance with this invention will now be described with reference to the accompanying drawings in which:-

Figure 1 is an under plan of a first example of pod fixed to the lid of a can;

Figure 2 is a section through the first example;

Figure 3 is an under plan of a second example of pod;

Figure 4 is a cross-section through a second example;

Figure 5 is an under plan of a third example;

Figure 6 is a cross-section through the third example;

Figure 7 is a cross-section through a completed can containing a third example of pod;

Figure 8 is an under plan of a fourth example of pod showing it attached to a lid of a container;

Figure 9 is a side elevation through the fourth example of pod attached to its lid;

Figure 10 is a cross-section through a completed can showing the fourth example of pod in place;

Figure 11 is a cross-section similar to Figure 10 showing the stay-on tab being opened;

Figure 12 is a view similar to Figure 10 with the stay-on tab fully opened;

Figure 13 is a cross-section through a top of a can showing a fifth example of pod;

Figure 14 is a diagram of a can sealing machine;

Figures 15A to E are a series of cross-sections through the top of a bottle showing the filling sequence of assembly of a pod;

Figures 16A and B are scrap radial sections showing the connection between the two parts of the pod shown in Figure 15;

Figure 17 is a diagram of a filling plant for carrying out the operation shown in Figures 15A to E;

Figure 18 shows an alternative pod for use in a bottle; and,

Figure 19 shows a further example of pod for use in a bottle.

DESCRIPTION OF PREFERRED EXAMPLES

In all the following examples a carbonated beverage container such as a can or bottle containing beer for example stout, an ale, or lager includes a pod made of plastics material. The pod lies wholly within the head space within the container above the level of the beverage.

The first few examples are systems where the beverage container is formed as a can 1 having a lid 2 with an easy-open feature in the form of a stay-on tab 3. As part of this easy-open feature the stay-on tab includes a shield portion 4 the periphery of which is defined by a weakened zone to enable the shield portion 4 to break free from the remainder of the lid 2 and pivot downwards into the inside of the can 1 upon opening the easy-open feature 3.

The example shown in Figure 1 shows a lid 2 before it is seamed on to the body of the can 1. A cup-shaped plastics pod 6 is fitted into the inside of the countersink portion of the lid 2 and fixed in place by a bead 7 of glue or by heat sealing the upper rim of the cup-shaped pod 6 to the underside of the lid 2. In plan the pod is generally C-shaped with its re-entrant portion fitting around the shield portion 4 of the easy-open feature 3. In this way the pod 6 does not in any way interfere with the operation of the easy-open feature 3.

Figures 3 and 4 show an alternative arrangement again illustrating the lid 2 before it is seamed onto body of a can 1. In this example the pod 6 is formed as a closed plastics moulding having both a top wall 8 and a bottom wall 9. The pod 6 also includes a flange 10 extending outwards from the periphery of the pod 6 which, in use, is trapped into the seam formed between the rim of the lid 2 and the top of the body of the can 1. Once the flange 10 is trapped into the seam the pod 6 is held fixed into position. The pod 6 may also be glued onto the lid 2 to provide at least a temporary bond to ensure that it is not

displaced during handling and seaming operations. Again, the pod 6 is generally C-shaped in plan and fitted with the re-entrant portion in register with the shield portion 4 of the easy-open feature 3.

The third example shown in Figures 5 and 6 is generally similar to the second example except that it does not include the flange 10 and is, instead, simply stuck onto the lid 2 by a band of glue 7 or a heat seal.

In all the above examples the pod 6 includes an aperture 11 in its lower wall 9 and a tube 12 sealed to the inside of the lower wall 9 and surrounding the aperture 11. The tube 12 extends upwards towards the lid 2.

In all the above examples the lid 2 together with the pod 6 is treated to ensure that all of the oxidising gas is removed from the inside of the pod 6 before the lid 2 is applied to the body of a can 1. The body of the can 1 is filled with beer 13 in a conventional can filling machine and then the head space 14 dosed with liquid nitrogen or solid carbon dioxide, again in a conventional fashion. The lid 2, together with the pod 6 is then seamed onto the top of the body of the can and as the liquid nitrogen or solid carbon dioxide evaporates builds up a pressure inside the can of between 1.5 and 4 atmospheres. Evaporated liquid nitrogen or solid carbon dioxide builds up in the head space 14 and passes into the inside of the pod 6 via the hole 11. The pressure inside the pod 6 is exactly the same as that in the head space 14. Typically the filled cans are then subjected to a pasteurisation process before being distributed.

Upon opening a can in accordance with this invention the initial opening of the easy open feature 3 vents the head space 14 to the atmosphere so that the pressure within the head space 14 is rapidly reduced to atmospheric. However, the pressure inside the pod 6 is still very much in excess of atmospheric pressure and this causes gas to be jetted through the hole 11. The jet of gas penetrates several centimetres into the beer 13 giving a mechanical

shock to the beer 13 and also causing shear in it. This shear in the beer cause the release of small bubbles of carbon dioxide and nitrogen and the gas that is jetted into the beer together with any gas from the head space that is entrained with the jet also results in the formation of bubbles in the beer 13. Naturally these bubbles gradually rise to the surface generating some further bubble formation as they go and form a layer of foam on the top surface of the beer 13. As the beer is poured out of the aperture left by the shield 4 in the lid 2 of the can and into, for example, a drinking vessel this layer of foam mixes with the remainder of the beer and this layer of foam generates bubbles throughout the beer as it is dispensed giving a similar appearance to that obtained when dispensing beer from draught.

Instead of making the pod 6 C-shaped as described in the first three examples above it is also possible to make the pod 6 circular as shown in Figures 8 to 12 and described with reference to the fourth example. In this example the pod 6 has a closed circular configuration with a projecting lip 15. The lip 15 is captured in the seam formed between the lid 2 and the body of the can 1 as the can is filled and sealed. The pod 6 is also adhered to the lid 2 by glue 7. The glue is of a type which is broken down on exposure to the beer 13 or to, for example, the temperatures attained during the pasteurisation step. A channel (not shown) is also provided between the outside of the top wall 8 of the pod 6 and the lower face of the lid 2. Oxidising gas is again removed from the inside of the pod 6 as described above before the lid 2 is seamed onto the body 1 of a full container as shown in Figure 10.

Upon initially opening the easy-open feature 3 as soon as the integrity of the package is broken the pressure from within the container is vented via the channel (not shown) between the top wall 8 of the pod 6 and the lower surface of the lid 2. This causes jetting of the gas from inside the pod 6 in exactly the way described previously and as

shown diagrammatically in Figure 11. Further and complete opening of the easy-open feature 3 which results in the shield portion 4 being pivoted downwards into the body of the can 1 breaks any remaining hold of the glue 7 on the pod 6 and causes it to pivot downwards with the lip 15 acting as a hinge as shown in Figure 12. Once the pod is moved into this position it does not in any way interfere with the flow of beer 13 through the aperture left in the lid 2 by the movement of the shield portion 4 of the easy-open feature 3.

In all the above examples the provision of the tube 12 surrounding the hole 11 in the bottom wall of the pod 6 ensures that only gas is jetted through the hole 11 during opening of the container. Should any beer be forced into the inside of the pod 6, for example, during filling or pasteurising steps this naturally falls to the bottom of the pod 6 and so is prevented from being jetted out of the pod 6 by the tube 12.

Another way of ensuring that no beer is jetted from the pod 6 upon opening of the container is described with reference to Figure 13. In this arrangement the pod 6 is provided with a valve which acts to prevent beer ever being forced into the pod 6. This example is generally similar to the fourth example in that it is generally circular and includes a lip 15 which is captured in the seam formed between the lid 2 and the body of the can 1 and acts as a hinge during opening of the can. The tube 12 is extended upwards to meet a rounded seating 16 formed on the top wall 8 of the pod 6. The lower wall 9 is made sufficiently thin for it to act as a pressure responsive diaphragm and preferably the pod is made from a gas permeable material such as low density polyethylene. In this way, when the pod 6 is first fitted to the lid 2 and the lid 2 seamed onto the can all oxidising gas has been removed from the inside of the pod 6 leaving it either in an evacuated state or filled with inert gas such as nitrogen or carbon dioxide at substantially atmospheric pressure. As soon as the lid

2 is seamed onto the can 1 the pressure inside the head space of the can quickly builds up to a super atmospheric pressure somewhere between 1.5 and 4 atmospheres. This pressure acting on the lower wall 9 of the pod 6 urges it upwards towards the lid 2 of the container so urging the top of the tube 12 tightly against the seating 16 completely to close and seal the pod 6. Over a period of time such as a week the nitrogen and carbon dioxide gas in the head space above the beer 13 in the can diffuses through the lower wall 9 of the pod 6 to increase the pressure inside the pod 6 until it is super atmospheric and an equilibrium is established between the gas in the pod and that in the head space.

Upon opening the can it operates in substantially the same way as the fourth example and, as soon as the pressure in the head space of the can has been vented, the pressure subsisting inside the pod 6 being, super atmospheric, causes the lower wall 9 to bow downwards and outwards. This removes the top of the tube 12 from its seating 16 and thus allows the gas at super atmospheric pressure from inside the pod 6 to be vented via the tube 12 and the orifice 11 so that it forms a jet which then penetrates the surface of the beer 13 again in exactly the same way as has been described with reference to the above examples.

In all of the above examples it is important to remove all of the oxidising gas from inside the pod 6 before the lid 2, with attached pod 6 is seamed onto the top of a filled can. This can be done by subjecting the pods with a permanently open orifice 11 to a series of evacuation and inert gas filling cycles to ensure that the pods are only filled with inert gas when they are seamed onto the cans. Alternatively, the pods can be made in two parts or, for example, when the first example of pod is attached to the lid, the pod can be dosed with an inert gas precursor such as liquid nitrogen or solid carbon dioxide. If the pod is dosed and assembled immediately before being seamed onto the can the inert gas drives substantially all of the

oxygen out of the pod immediately before they are seamed onto the can.

Figure 14 shows diagrammatically a typical can filling arrangement. In this example a steam of cans A are fed to a rotary filling station B in which they are filled with a predetermined volume of beer. They then pass along beneath a liquid nitrogen dosing station C and thence to a standard seaming machine H where the lids are applied to the open tops of the cans before the closed and sealed cans leave a stream I. In this system a bag of lids 2 with attached pods 6 are loaded into hopper D from which they are fed to a turn table E. As the lids and pods circulate around the turn table E they are subjected to a series of evacuation and inert gas charging steps before being fed along a closed inert gas filled path G to an end feed star forming part of the seaming machine H.

The sixth example is for a draught-in-bottle system which is especially suited to beers such as lager which are usually served at a lower temperature and at a higher gas content, around 2.0 v/v, than ales or stouts. Bottles can withstand higher internal pressures than cans which above 6 to 6.5 bar tend to "peak" with resulting distortion of the can. Such pressures can be anticipated when beers containing around 2.0 v/v carbon dioxide are put into packages which are then further pressurised with nitrogen. In the example a screw topped bottle 20 is initially filled with beer on a conventional rotary filling machine and its neck detail is shown in Figure 15A. The head space in the neck of the bottle 20 is then purged with an inert gas as indicated by the arrows in Figure 15B or the beer made to foam by jetting a small volume of liquid into its top surface to remove all of the oxidising gas from the head space of the bottle. Then the pod 6 having a generally cylindrical form and an upper flange 21 is inserted into the head space in the neck of the bottle 20. The pod 6 has an open-top, a hole 11 in its lower wall and a tube 12 sealed to the lower wall around the hole 11 and extending

upwards. Liquid nitrogen 30 is dosed into the pod 6 and then a cap 22 complete with plastic wad liner 23 is placed over the neck of the bottle and crimp rolled onto screw threaded formations 24 on the neck of the bottle to close the bottle. The plastic wad liner 23 forms a seal with the flange 21 at the top of the pod 6 to close the pod 6 and to seal the bottle. As the liquid nitrogen 30 evaporates it firstly removes all of the oxygen from the pod 6 before it is closed by the cap 22 and also provides pressurisation for the bottle 20. Upon opening the bottle by unscrewing the cap 24 this releases the pressure in the head space above the beer 13 and results in the super atmospheric pressure from within the pod 6 being jetted via the inside of the tube 12 and the hole 11 into the beer 13. As the screw cap 22 is completely removed it carries with it the pod 6 so allowing the beer 13 to be dispensed from the neck of the bottle.

Figures 16A and B show in greater detail how the flange 21 of the pod 6 is engaged with the packing wad 23 as the cap 22 is rolled around the thread finish of the bottle 24.

Figure 17 illustrates a typical rotary filling machine with a stream of bottles P being applied to a rotary filling station Q where they are filled with beer and from there fed to a second rotary carousel R where the pods 6 are inserted. The bottles then travel under a liquid nitrogen dosing station S and finally to a rotary cap applying and crimping station T.

An alternative two-part form of pod for use with a bottle is shown in Figures 18 and 19. This system is designed for use with a conventional crown type bottle closure 25. In the example shown in Figure 18, the pod 6 is formed in two parts. A first, lower part 26 which includes the hole 11 and tube 12 which is arranged to snap-fit onto an upper part 27 which also includes a protruding flange 28 which acts as a gasket between the crown cap 25 and the top rim of a bottle neck. In this arrangement the upper part

27 is pre-assembled with the crown 25 and then the lower part 26 is dosed with liquid nitrogen 30. The two parts are assembled, inserted in the bottle neck and then the crown cork 25 is crimped onto the neck of the bottle in a conventional fashion. Crimping the crown 25 onto the bottle also ensures that the crown 25 tightly engages the flange 28 to ensure that when the crown cap is removed from the bottle it carries with it the pod 6.

In the system shown in Figure 19 the pod 6 is again formed in two parts, a first lower part 26 which includes the hole 11 and tube 12 and which is arranged to snap-fit onto a second upper part 27. In this example the lower part carries the flange 28 which acts as a gasket between the crown cap 25 and the top rim of the bottle neck. In this arrangement the upper part 27 is pre-assembled with the crown 25. The lower part 26 is inserted in the bottle neck supported by the flange 28. After the bottom part 26 is dosed with liquid nitrogen 30 the crown cap 25 together with the upper part 27 of the pod is pushed downwards on top of the lower part 26 to snap-fit the two parts together. Then the crown 25 is crimped onto the bottle in a conventional fashion. Again crimping of the crown 25 onto the bottle also ensures that the crown 25 tightly engages the flange 28 to ensure that when the crown cap 25 is removed from the bottle it also carries with the the pod 6.

C L A I M S

1. A container (1) containing a carbonated beverage (13), including a pod (6) located within the head space (14) above the level of the beverage (13) and containing a gas, the pod (6) including a hole (11) in its lower part above the level of the beverage (13) and means (12, 16) to ensure that only gas is discharged from the pod (6), the arrangement being such that when the container (1) is closed the pressures of the gas in the pod (6) and in the head space (14) are in equilibrium, but, as soon as the container (1) is opened to reduce the pressure inside the head space (14) of the container (1) the gas at super atmospheric inside the pod (6) is jetted out of the hole (11) and into the beverage (13) in the container (1) to cause shear of the beverage (13) and the liberation of small bubbles which accumulate in a surface layer on the beverage (13), when the beverage (13) is dispensed the small bubbles in its surface layer act to seed the generation of small bubbles throughout the remainder.

2. A container according to claim 1, in which the means to ensure only gas is discharged comprises a tube (12) surrounding the hole (11) in the lower wall of the pod (6) and extending upwards towards the top of the container.

3. A container according to claim 1 or 2, in which the hole (11) in the lower part of the pod has a diameter between 0.1 and 2.0 mm.

4. A container according to claim 3, in which the hole (11) has a diameter of substantially 0.9 mm.

5. A container according to any preceding claim, in which the pod (6) is formed from two parts which are snap-fitted together, or welded together.

6. A container according to claim 5, in which the parts are fitted together in an atmosphere containing a inert gas.

7. A container according to claim 6, in which the parts are fitted together after being dosed with a precursor of an inert gas such as dry ice or liquid nitrogen (30).

8. A container according to any preceding claim, in which the pod (6) is attached to, or, at least held in place by a top closure (2) of the container.

9. A container according to any preceding claims having the form of a glass bottle and the pod (6) substantially filling the head space in the neck (20) of the container (1) and being attached to a closure (22) of the bottle so that, upon opening the container the pod (6) is removed from the neck (20) of the bottle with the closure (22).

10. A container according to any preceding claim having the form of a metal can (1), the pod (6) being either fixed to the lid (2) of the can (1) by adhesive or being held in place by being trapped in the seam formed between the lid (2) and the side wall of the can (1).

11. A container according to claim 10, including a easy-open feature (3) such as a ring-pull or a stay-on tab (4) in which the pod (6) does not cover the entire under surface of the lid (2) and is arranged to be absent from a portion of the lid (2) immediately beneath the easy-open feature (4).

12. A container according to claim 10, including an easy-open feature, in which the pod (6) is temporarily attached to the inside of the lid (2) by an adhesive which breaks down on contact with a beverage (13) or on the application of heat, for example, during a pasteurisation step, and in which the pod (6) is also connected to the container by a protruding lip (15) which is caught in the seam between the lid (2) and the side wall of the can (1) so that, upon opening the container the pod (6) can hinge about its protruding lip (15) to allow the pod (6) to be displaced from beneath the easy open feature (4) and thereby allow a beverage (13) to be dispensed from the inside of the can.

Fig.1

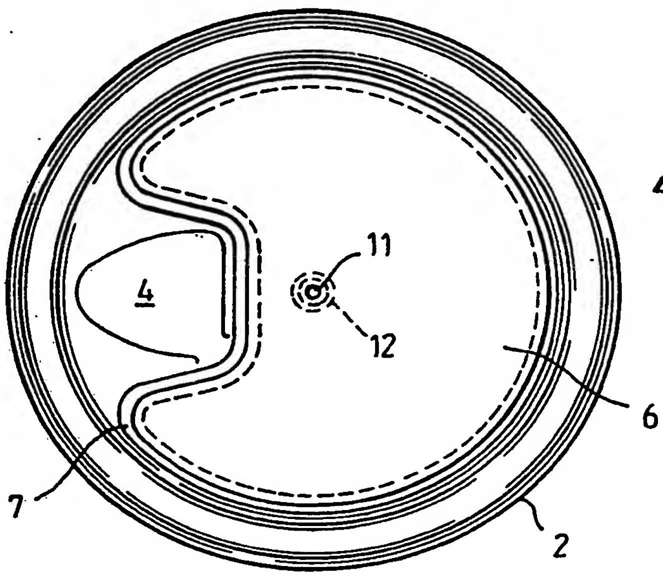


Fig. 2

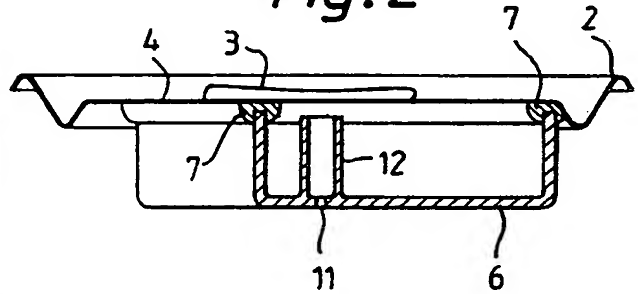


Fig.3

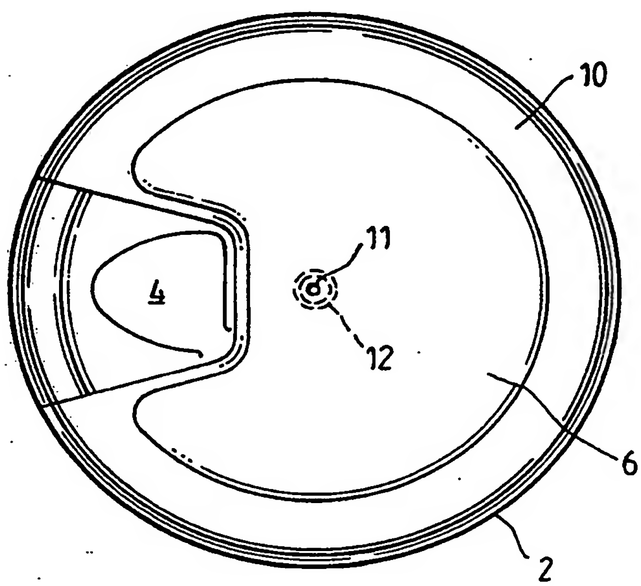


Fig.4

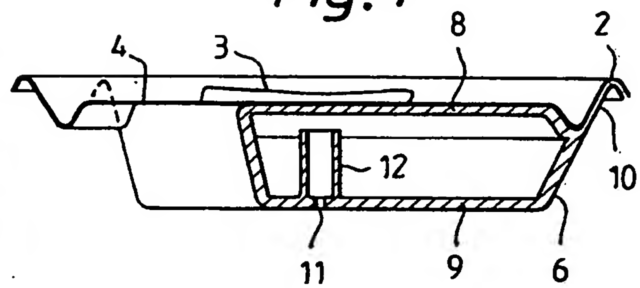


Fig. 5

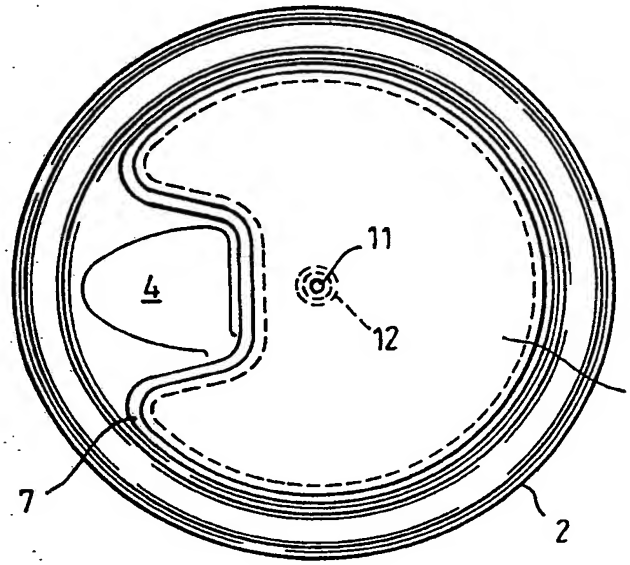


Fig. 6

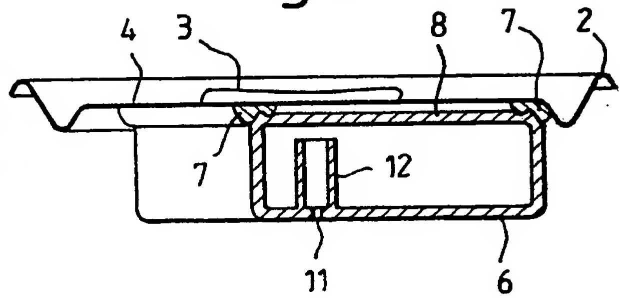


Fig. 7

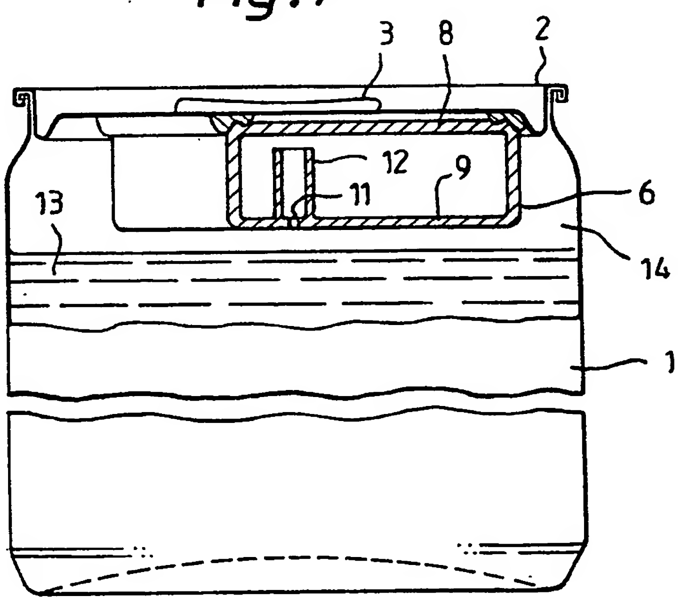


Fig. 8

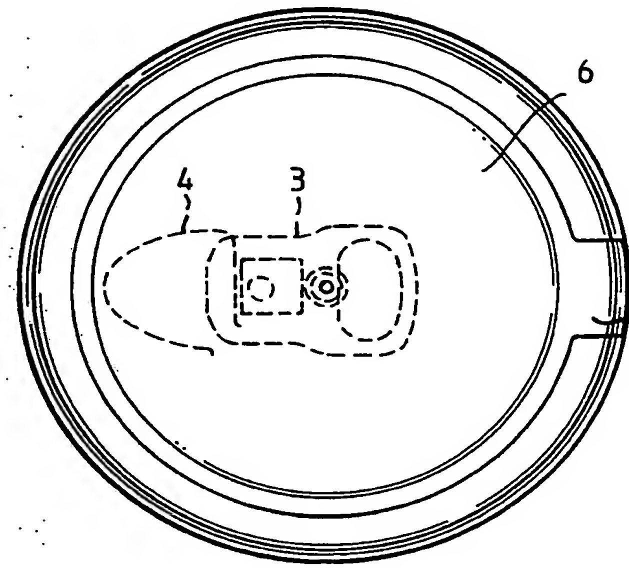


Fig. 9

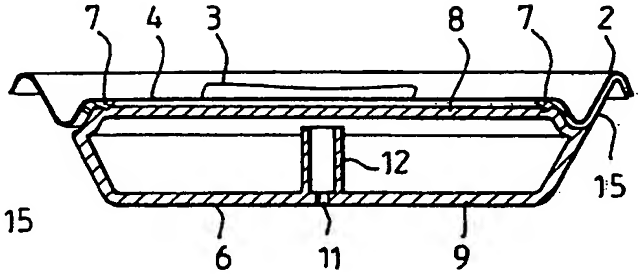


Fig. 10

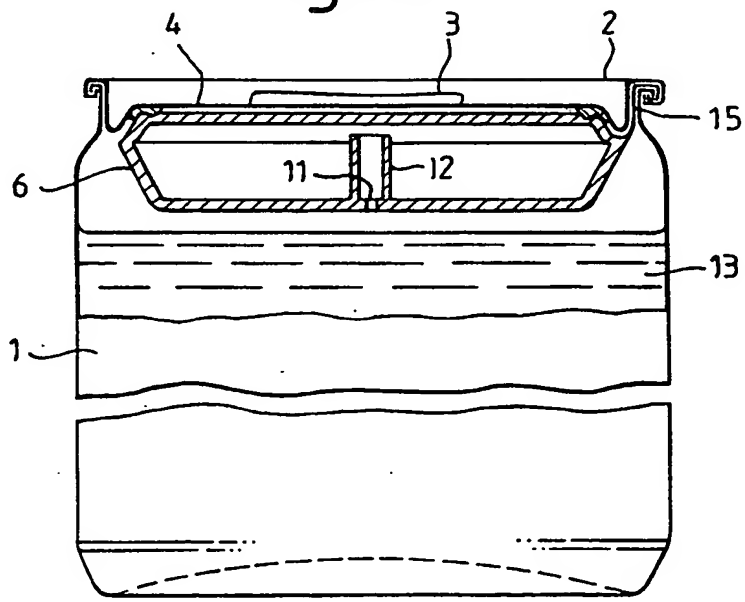


Fig 11

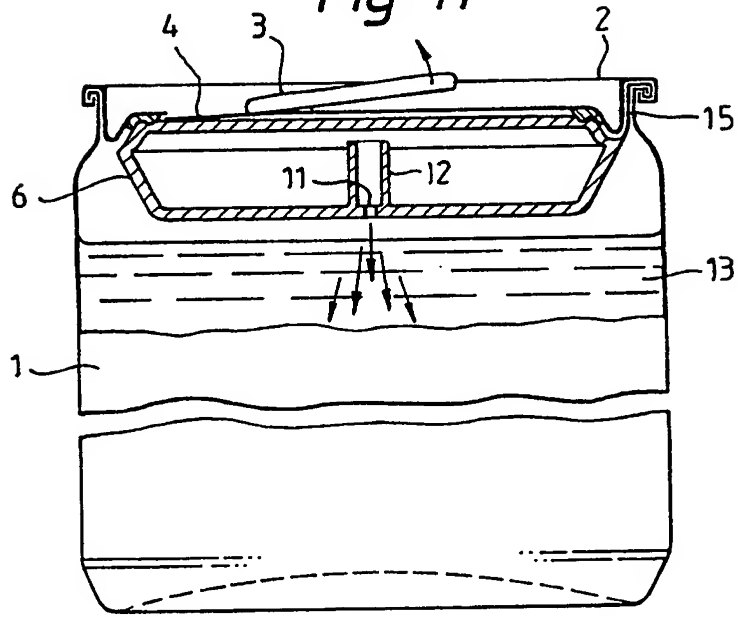


Fig.12

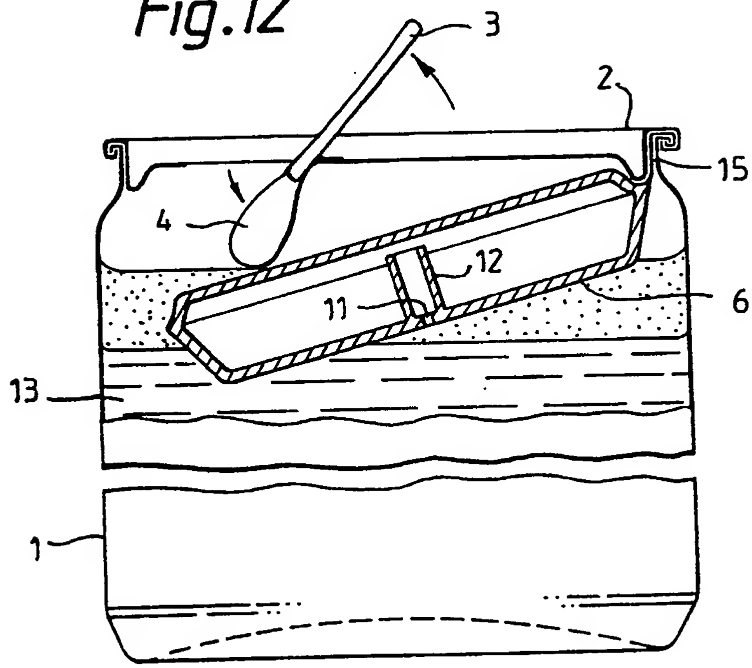


Fig. 13

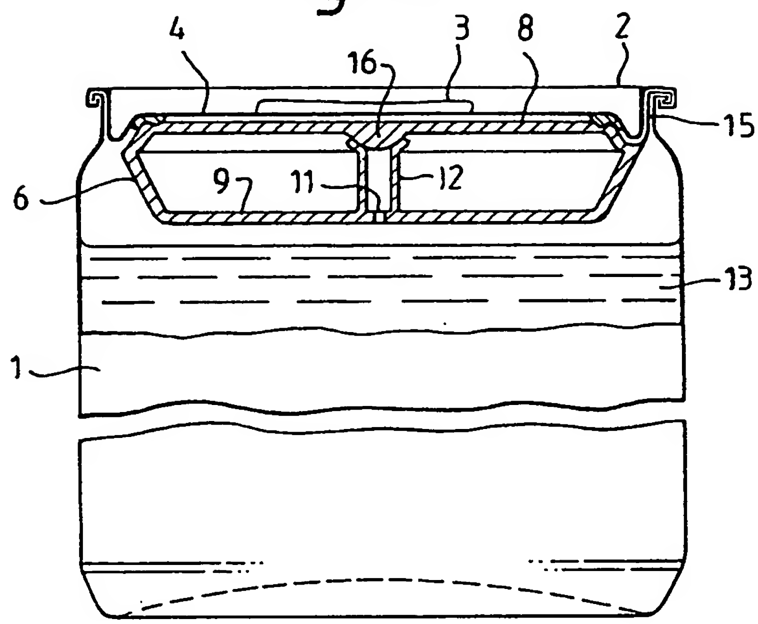


Fig. 14

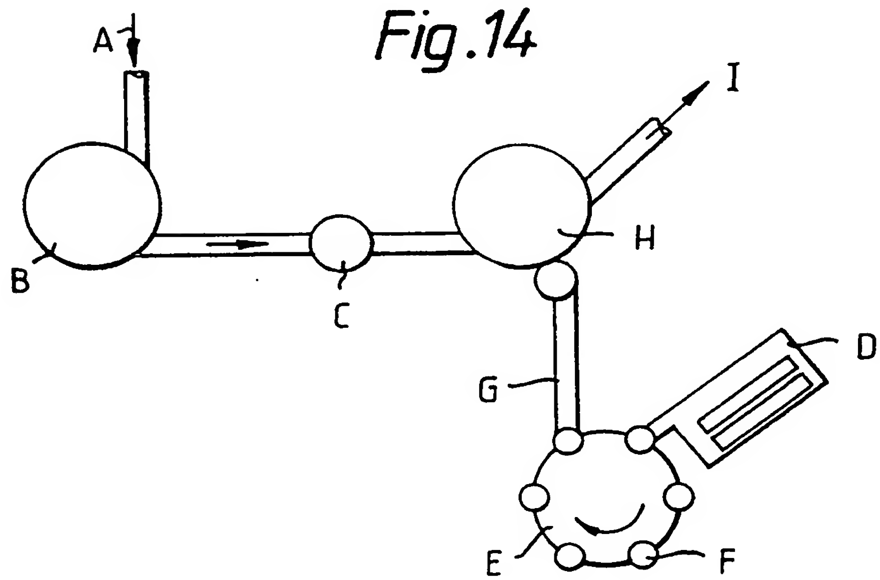


Fig. 15A

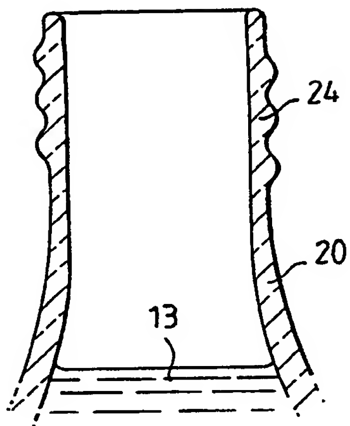


Fig. 15B

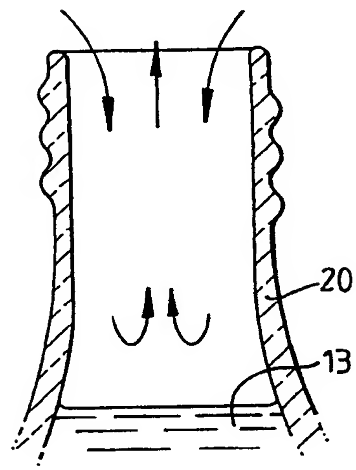


Fig. 15C

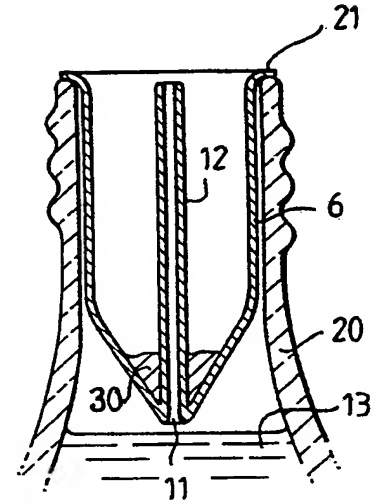


Fig. 15D

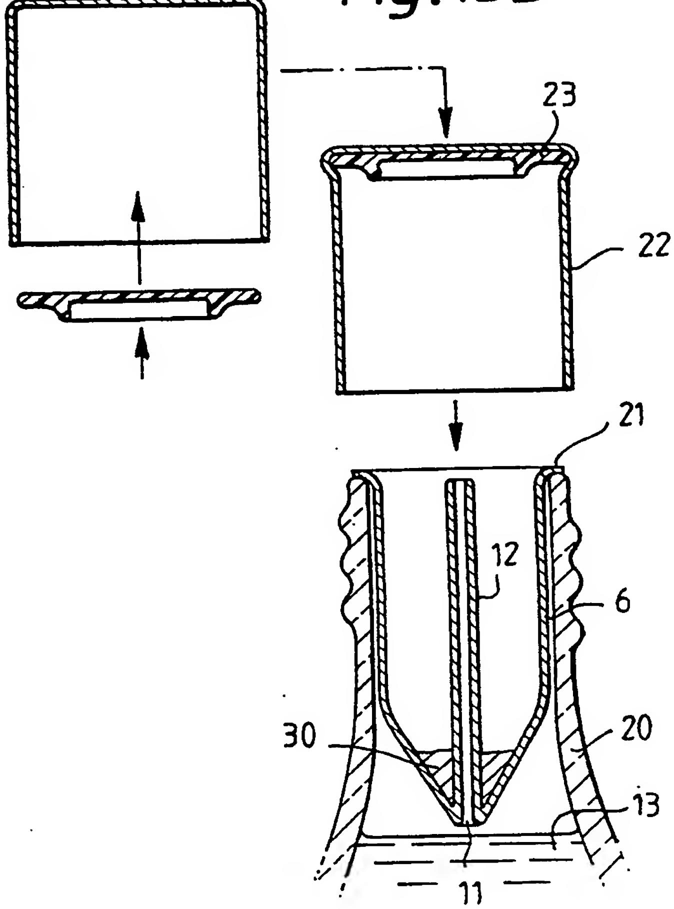


Fig. 15E

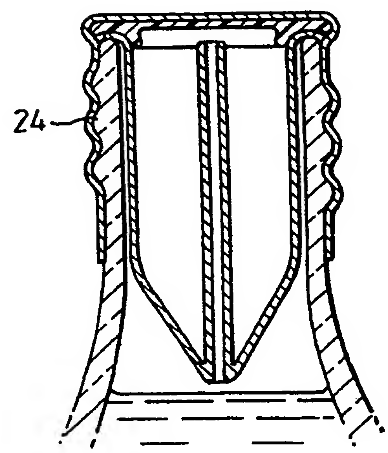


Fig 16A Fig 16B

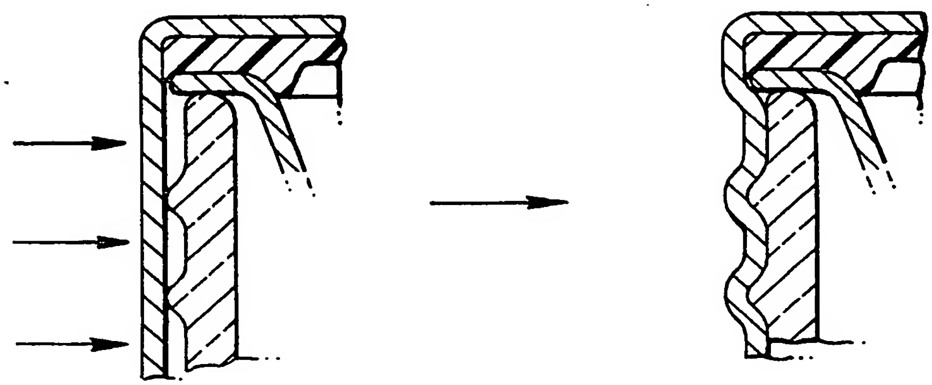


Fig. 17

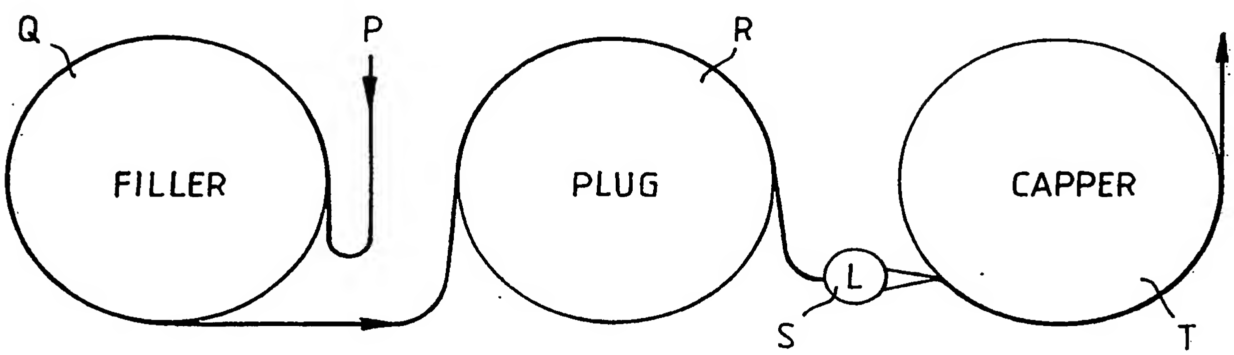
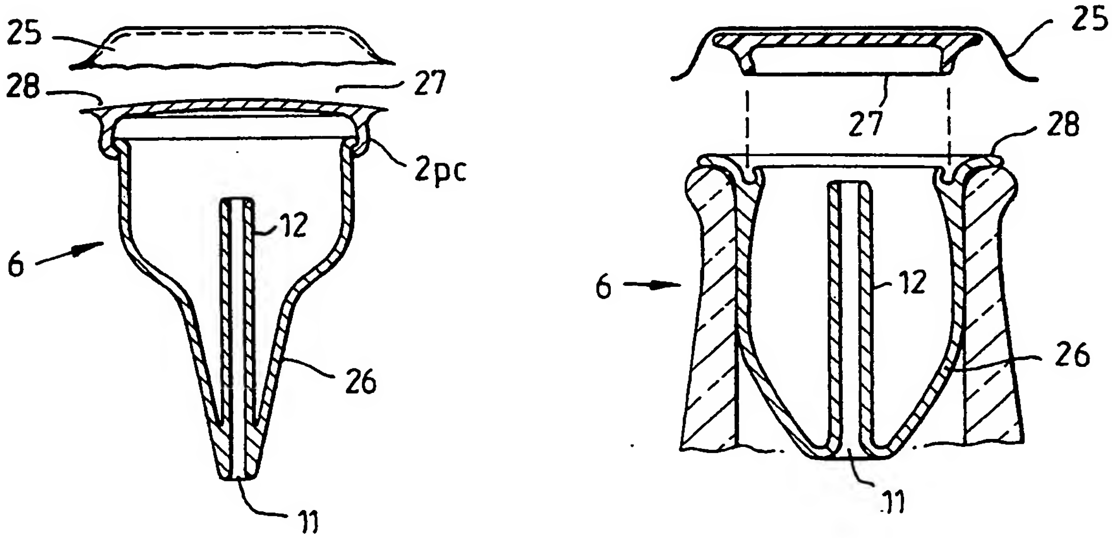


Fig. 18 Fig. 19



INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 93/00239

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 B65D79/00

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	B65D ; B67D

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
A	WO,A,9 109 781 (WHITBREAD) 11 July 1991 see the whole document	1
A	WO,A,9 200 896 (E J PRICE) 23 January 1992 see the whole document	1
A	DE,A,2 002 976 (GUINNESS) 30 July 1970 see claim 1; figures & GB,A,1 266 351 (GUINNESS) 8 March 1972 cited in the application	1,9

° Special categories of cited documents : [10]

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

1

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
19 APRIL 1993	21. 04. 93
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	NEWELL P.G.

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

GB 9300239
SA 69733

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The members are as contained in the European Patent Office EDP file on
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